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A Survey on Cost Effective Scheduling Techniques for Cloud Computing

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Abstract
Task scheduling is a challenging issue in cloud computing. Efficient use of resources and reduced cost is the ultimate goal of the provider and the cloud users. Scheduling can be done based on several criteria's and algorithms. Numerous Task scheduling algorithms like FIFO, Priority based, Round Robin are used to schedule the jobs. QOS always plays an important role in scheduling the jobs so as to use the resources efficiently in a cost effective manner. So in this paper a survey has been done on various cost effective QOS based scheduling techniques.

Keywords: *Cloud Computing, QOS, Scheduling, cost, Resources.*

INTRODUCTION

Cloud computing is a technology that provides services for its users over the internet. Like traditional computing users need not install or buy the software instead of that they can go for pay for use method on which the cloud works. End of the day the service provider charges the user for the amount of services they have used. To accomplish this in a cost effective manner they have to consider the maximum profits for the resource providers and the users. Actually, a task scheduling has an important role in how to meet Cloud computing users' job QoS requirements and use the Cloud resources efficiently in a cost effective way. Usually users always think which Cloud computing resource can meet their job QoS requirements for computing (such as the due time of job finishing, the computing capacity etc.) and how much money they must pay for the Cloud Provider. While the service Provider always think how to gain maximum profits by offering Cloud Computing resources, while meeting the QoS requirements of the user. To make these two meet, the task scheduling system must use efficient and cost effective methods. Taking this issue into account in this paper a survey has been done on various QOS based scheduling techniques.

VARIOUS SCHEDULING TECHNIQUES

Abirami S.P. and Shalini Ramanathan [1] a linear scheduling algorithm for efficient resource scheduling has been discussed. It schedules the resources among the requestors and maximizes the resource utility. STF algorithms are better than the FCFS algorithms in fulfilling the requirements of the users and providers.. The algorithm improves the resource utilization and the response time.

Amit Nathan,Sanjay [2] the author talks about dynamic planning of task scheduling to achieve maximum resource utilization is used. It uses four policies for resource scheduling.

Bo Yin, Ying Wang, et.al [3] authors consider the issue of how to manage and arrange large-scale jobs submitted to cloud in order to optimize resource allocation and reduce cost. For this they used multidimensional algorithms which have certain disadvantages.

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Fetahi Wuhib,Rolf Stadler,Mike [4] Dynamic resource management gives the particular challenges in large-scale cloud environment. To obtain the efficient heuristic solution to the problem such as to minimize the adaption cost for resource allocation and resource utility using gossip protocol.

G.Sireesha, L.Bharathi [5] the authors explains a Parallel data processing which is one of the major issue for Infrastructure-as-a-Service (IaaS) clouds. They use graph methods to perform scheduling.

In [6] the hybrid resource management architecture to perform location aware VM placement and dynamic resource utilization management is used. This paper considers the utility function to find out which PM is appropriate for a new VM or migration, the provider evaluates each PM using a utility function.

In [7] a method of finding work load of data center for efficient resource management. In cloud computing, the resources are provided by the service providers based on virtualization to satisfy the demands of users. Since cloud computing services are delivered over the internet, there may be undesirable response latency between the users and the data centers. The proposed method of Finding work load of data center and distance between user and data center avoids the response latency. It provides better response time and resource utilization. But it is not cost effective and overhead may occur.

Gunho Lee,Niraj et.al [8] A genetic algorithm to find an optimized solution in a large search space is used. The prediction engine maps resource allocation candidates to the scores that measures their "fitness" with respect to a given objective function, so that Topology Aware Resource Allocation (TARA) can compare and rank different candidates. It reduces the job completion time of applications.

Gunho Leey et.al [9] To improve performance and cost-effectiveness of a data analytics of a cluster in the cloud, the data analytics system should account for heterogeneity of the environment and workloads.

In [10] a well optimized Force directed search algorithm for SLA based resource allocation problem of multi-tier applications in cloud computing. Considering two important things in SLA model average response time guaranteed SLA and SLA that has a price pre request based on the response time. The model considers two types of SLA classes are Gold SLA class and Bronze SLA class.

Jiayin li,Meikang [11], authors propose an adaptive resource allocation algorithm for preemptive tasks for cloud system. The algorithm adjusts the resource allocation adaptively based on the updated of the task executions. Adaptive list scheduling (ALS) and adaptive min-min scheduling (AMMS) algorithms are used for task scheduling which includes static task scheduling.

Koti Reddy S, Ch. Subba Rao [12] A Particular tasks of the user's job are assigned to different types of virtual machines which are automatically instantiated and terminated during the job execution. The proposed model uses location based task scheduling. If the user creates a fake ID for accessing the services, the user's location can disclose the user's identity. If users want to access services they should sent their location to a trusted server and they are authorized. Task scheduling considers the location based services. It provides the privacy protection.

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In [13] The proposed model efficiently reallocates the resources. Job scheduling system plays a very important role in how to meet Cloud users job's QoS requirements and use the cloud resources efficiently in accost effective way.

In [14] the paper, proposes a profit model algorithm to minimize the infrastructure cost and SLA violations. The developed resource algorithm is used to maintain the resource available in the service provider center. The priority algorithm is used for better resource allocation jobs in the cloud environment.

In [15] Rule based resource manager is used for the hybrid environment, which increase the scalability of private cloud on-demand and reduces the cost. Also the time for public cloud and private cloud to fulfill the request and provide the services on time is considered. Depending on the resource utilization rate and cost we can evaluate the performance of Resource Manager in the hybrid cloud environment.

In[16] When there are more requests competing for the same resource at the same time, the available resources are insufficient to service the arrived requests. The aim of load balancing in the cloud computing environment is to provide on demand resources with high availability.

Shaminder Kaur., [17] a Modified Genetic Algorithm (MGA) is used to generate an initial population of individuals which schedules the Longest Cloudlet to Fastest Processor (LCFP), Smallest Cloudlet to Fastest Processor (SCFP).

Shikharesh Mujumdar [18], Match making and scheduling is used to represent the resource allocation in cloud computing. Allocating of jobs is done from the resource pool. During scheduling, jobs are mapped to a selected resource that is to be executed.

Shin-ichi Kuribayashi [19] in this the resource allocation methods used are the Best-Fit approach and Round Robin. Multiple tasks are considered at the same time. Processing ability and Bandwidth are the parameters consider. Best-Fit approach is preferred to reserve as much as possible for future request which may require large size of ability or bandwidth and also reduce the possibility of deadlocks. The Round robin method selects the center in a pre-defined order.

In[20] An economic resource allocation model has been discussed. The co-allocation model where a DRIVE. In this Meta scheduler is to optimize the execution time and utilization rate.

A COMPARISON ON VARIOUS TECHNIQUES BASED ON THE METRICS

Table: 1. *Comparison among various Techniques*

Techniques	Resource management strategy	Resource utilization	scalability	Performance	Throughput	Response time	Overhead associated	Cost efficiency	Service level agreement
Linear scheduling strategy					✔				
policy based resource allocation	✔								✔
Multi-Dimensional	✔								

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Resource allocation algorithm									
AGossip Protocol For Dynamic Resource Management		✔							
ExploitingDynamic Resource Allocation								✔	
Location-Aware Dynamic Resource Allocation			✔		✔				
A TIME-DRIVEN Adaptive Mechanism	✔				✔				
Topology-Aware Resource Allocation		✔	✔						
Heterogeneity-Aware Resource Allocation		✔						✔	
Multi-Dimensional SLA-Based Resource Allocation						✔			
Adaptive Resource Allocation	✔				✔				
An Approach for Effective Resource Management in Cloud								✔	
Resource Allocation Model for Efficient Management									✔

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A Rule-based Approach	✔								
Enhanced Load Balancing approach					✔				
Just in Time Clouds			✔		✔				
Efficient Approach to Genetic Algorithm for Task Scheduling									
Resource management on cloud: Handling uncertainties in parameters and policies	✔		✔					✔	
Optimal Joint Multiple Resource Allocation		✔		✔					
Efficient Resource Allocation Strategies using DRIVE	✔								

CONCLUSION

In this paper a detailed survey has been done on the various scheduling techniques that are used in the cloud computing environment so as to effectively allocate the resources in a cost effective manner. As task scheduling is a challenging issue in cloud computing the efficient use of resources and reduced cost is the ultimate goal of the provider and the cloud users. Scheduling can be done based on several criteria's and algorithms. The survey has been done on various cost effective scheduling methods.

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